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Technical Data | September 2020

3M™ Electronic Surfactant 4300

Product Description

3M™ Electronic Surfactant 4300 is an anionic fluorochemical surfactant having 20% active material in glacial acetic acid. 3M surfactant 4300 was designed as an additive to improve wetting in low pH aqueous solutions used in semiconductor and microelectronics processing. When used in low pH aqueous solutions, including phosphoric acid or phosphoric/acetic/nitric (PAN) solutions, 3M surfactant 4300 significantly lowers the surface tension and improves the wetting of the solution. This improved wetting can improve the uniformity of the etch while having little to no impact on the etch rate. 3M surfactant 4300 has excellent stability in many of the acids commonly used in semiconductor and microelectronics processing.

Key Features

- Improved wetting on etch solutions
- Little to no effect on the etch rate
- Stability in etch solutions
- Effective at low concentrations
- Filterable

Applications

- Etch and cleaning solutions in semiconductor, microelectronics, flat panel display and solar panel manufacturing including:
    - Aluminum or copper metal etch
    - Silicon nitride etch
    - Cleaning or etching of silicon or quartz surfaces

Composition

Component	3M™ Electronic Surfactant 4300
Ammonium Fluoroalkyl sulfonamide	20% by weight
Glacial Acetic Acid	80% by weight

Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Property	3M™ Electronic Surfactant 4300
Appearance	Clear white or light yellow liquid
Specific Gravity	1.1 (9.1 lb/gal, 1.1 kg/L)
Viscosity	1.2 cps
Surfactant Type	Anionic

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Typical Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Final product specifications and testing methods will be outlined in the products Certificate of Analysis (COA) that is shipped with the commercialized product.

Surface Tension (dyn/cm) of 3M™ Electronic Surfactant 4300 in Various Solutions					
Solution	**0 ppm**	**50 ppm**	**100 ppm**	**200 ppm**	**2000 ppm**
85% H_3PO_4	74	19	19	19	19
16:1:1:2 PAN[A]	62	25	20	20	19
7:1 BOE[B]	70	21	21	21+	18+
500:1 BOE[C]	56	21	21+	21+	21+

A – 16 parts 85% H_3PO_4, 1 part glacial acetic acid, 1 part 70% HNO_3, and 2 parts water by volume
B – 7 parts 40% ammonium fluoride to 1 part 49% hydrofluoric acid by volume
C – 500 parts 40% ammonium fluoride to 1 part 49% hydrofluoric acid by volume
+ – Not fully soluble
* Concentrations listed are 3M™ Electronic Surfactant 4300 in solution by weight based on active material
* Surface tension measured using Wilhelmy plate method of ASTM D1331

Surface Tension (dyn/cm) of 3M™ Electronic Surfactant 4300 in Various Solutions						
Solution	**0 ppm**	**100 ppm**	**200 ppm**	**500 ppm**	**1000 ppm**	**2000 ppm**
Water	73	35	31	23	21	20
1:1:5 NH_3:H_2O_2:H_2O[A]	72	27	22	19	19+	
1:1:5 HCl:H_2O_2:H_2O[B]	72	19	18	18	19	18
100: 1 HF[C]	72	28	24	19	18+	18+
2.38% TMAH	73	24	20	19	19+	19+

A – SC-1, 1 part 29% NH_3, 1 part 30% H_2O_2 and 5 parts water by volume
B – SC-2, 1 part 29% HCl, 1 part 30% H_2O_2 and 5 parts water by volume
C – 1 part 49% HF and 100 parts water by volume
+ – Not fully soluble
* Concentrations listed are 3M™ Electronic Surfactant 4300 in solution by weight based on active material
* Surface tension measured using Wilhelmy plate method of ASTM D1331

Surface Tension (dyn/cm) of 3M™ Electronic Surfactant 4300 in 85% H_3PO_4 at 160°C			
Concentration	**Initial**	**5 days**	**8 days**
50 ppm	20	20	29
100 ppm	19	19	19
200 ppm	19	19	19

* Concentrations listed are 3M™ Electronic Surfactant 4300 in solution by weight based on active material
* Surface tension measured using Wilhelmy plate method of ASTM D1331

Product Safety and Handling

3M™ Electronic Surfactant 4300 is intended for use in cleaning and etch solutions at microelectronics processing and semiconductor, flat panel display and solar panel fabrication facilities.

The recommended method of disposal is high temperature incineration in a facility capable of handling halogenated materials.

Release of 3M™ Electronic Surfactant 4300 to the environment must be prevented. Prevention includes, but is not limited to, treatment of surfactant containing aqueous waste streams.

For additional product safety and handling information, please read the product label and Material Safety Data Sheet before using this product.

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Regulatory

The components of 3M™ Electronic Surfactant 4300 are in compliance with the chemical notification requirements of the United States (TSCA). Certain restrictions apply. Contact 3M representative for an update on the regulatory status of 3M™ Electronic Surfactant 4300.

Storage and Shelf Life

The shelf life of 3M™ Electronic Surfactant 4300 is 36 months from the date of manufacture when stored in the original packaging materials and stored at 21°C (70°F) and 50% relative humidity.

Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is manufactured and deemed commercially available from 3M. The COA contains the 3M test methods, specifications limits and test results for the product's performance attributes that the product will be supplied against. Contact your local 3M representative for this product's COA.

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Safety Data Sheet: Consult Safety Data Sheet before use.

Regulatory: For regulatory information about this product, contact your 3M representative.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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